Formulae

Notes and guidance

In this small step, children are introduced to formulae using symbols for the first time, although they will be familiar with the idea of a formula in words, for example area of a rectangle = length × width.

Building on the previous steps, children substitute into formulae to work out values, noticing the effect that changing the input has on the output. Looking at familiar relationships between two or more variables will help to develop children's understanding, for example the number of days in a given number of weeks, the number of legs on a given number of insects and so on.

Children should recognise the difference between a formula and an expression, noticing that an expression does not have the equals sign, but a formula does.

Things to look out for

- Children may mix up the variables in a formula, for example using $w = 7d$ to represent the formula for the number of days in a given number of weeks.

Key questions

- What is a formula?
- What formulae do you know?
- How is a formula similar to/different from an expression?
- What is the formula for _____?
- If the formula is $t = 3s + 1$ and you know that $s = $ _____, how can you work out t?
- Which letter(s) do you know the value of? Which letter(s) can you work out?

Possible sentence stems

- In the formula _____ , the letter _____ represents _____ and the letter _____ represents _____
- To work out _____ when I know _____ , I substitute _____ into the formula.

National Curriculum links

- Use simple formulae
- Express missing number problems algebraically

Formulae

Key learning

- Ron uses a formula to work out the areas of rectangles.

  $A = lw$
  When $l = 7$ and $w = 4$, $A = 7 \times 4 = 28$

  ▶ What do the letters A, l and w represent?

  ▶ Use the formula to find the areas of the rectangles.

  3 cm
  6 cm

  3 cm
  6 cm

  4 cm
  10 cm
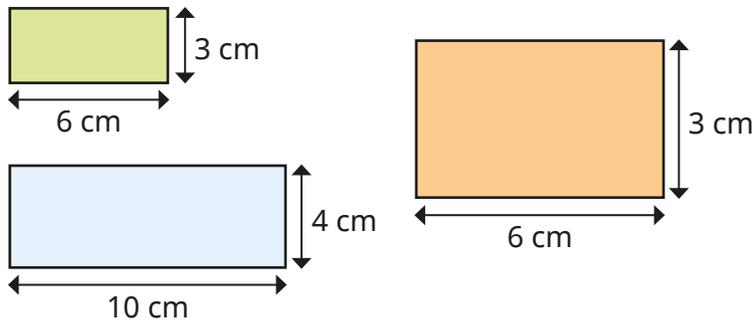
- The time taken to cook a turkey is 90 minutes, plus an additional 20 minutes for every kilogram of turkey.

  This can be written as the formula $T = 90 + 20m$

  ▶ What do the letters T and m represent?

  ▶ Use the formula to work out the time to cook:

  - a 3 kg turkey
  - a 10 kg turkey

- Fay makes a sequence of patterns with stars and circles.
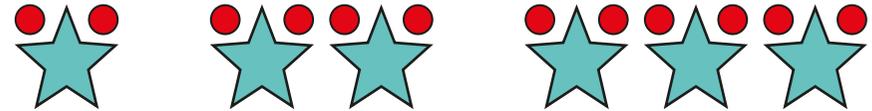
  Complete the table to show the number of circles and stars in the patterns.

Number of stars	1	2	3	5		
Number of circles	2				18	30

  If s = number of stars and c = number of circles, which formula describes Fay's pattern?

$s = 2 + c$	$c = s + 2$	$c = 2s$	$s = 2c$	$2s = c + 2$

- The table shows the total number of legs on a given number of ants.

Number of ants (a)	1	2	3		
Number of legs (L)	6			30	72

 Complete the table and write a formula that describes the pattern.

Formulae

Reasoning and problem solving

S = number of spiders

L = total number of legs
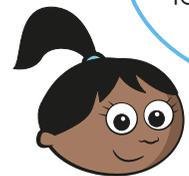
I think that the formula for working out the total number of legs for a number of spiders is $S = 8L$.

No

Do you agree with Sam?

Explain your answer.

Max and Jo use this formula to work out the cost in pounds (C) of four hours (h) of cleaning.

$$C = 20 + 10h$$

I think it is £120

Max

I think it is £60

Jo

Jo

Who do you agree with?

Explain your answer.